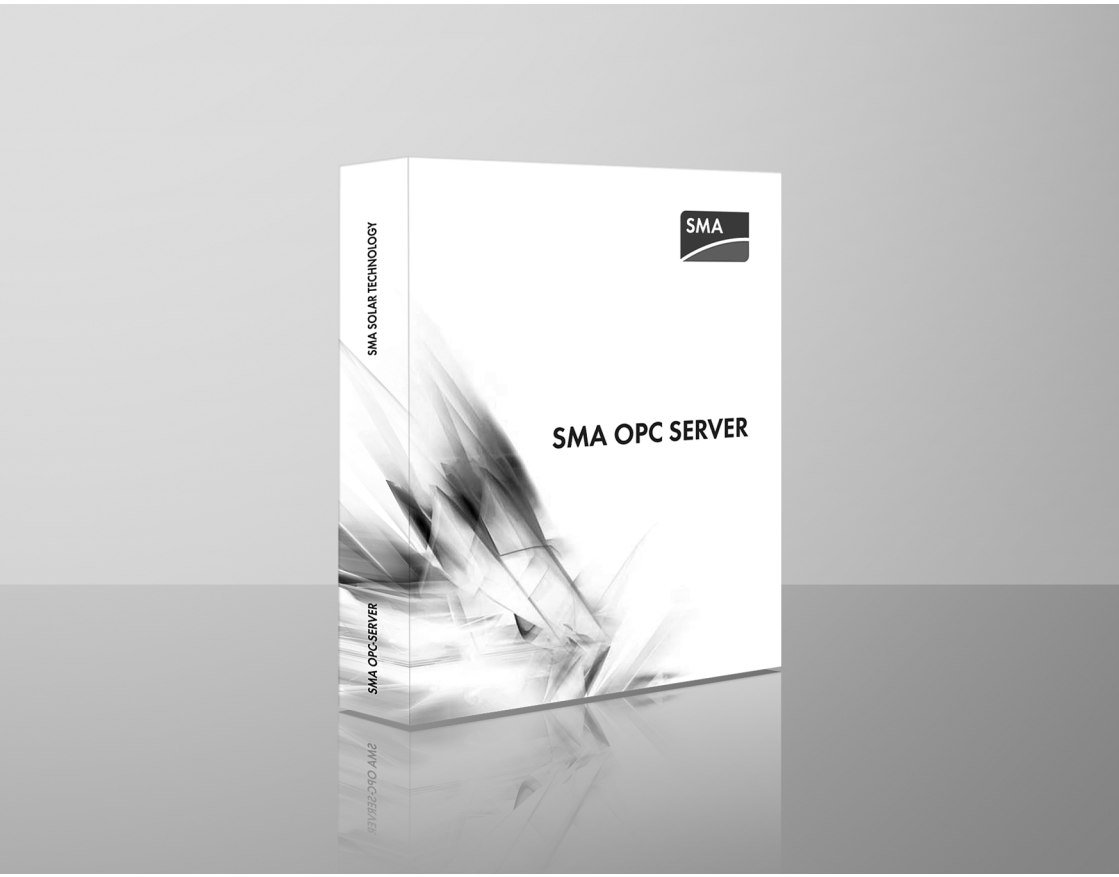
System Monitoring

SMA OPC SERVER

User Manual



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1 Notes on this Manual

This manual describes the installation, configuration and operation of the SMA OPC Server.

1.1 Validity

This manual is valid for the SMA OPC Server software version 1.1, and later.

1.2 Target Group

This manual is intended for system administrators and users.

1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

DANGER

DANGER indicates a safety instruction which, if not followed, will result in certain death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury!

NOTICE

NOTICE indicates a situation that can result in property damage if not avoided.

Information

Information provides tips that are valuable for the optimal installation and operation of your product.

2 SMA OPC Server

2.1 Functions

The SMA OPC Server is a server-based 32 bit application for standardized data exchange with devices from SMA Solar Technology AG.

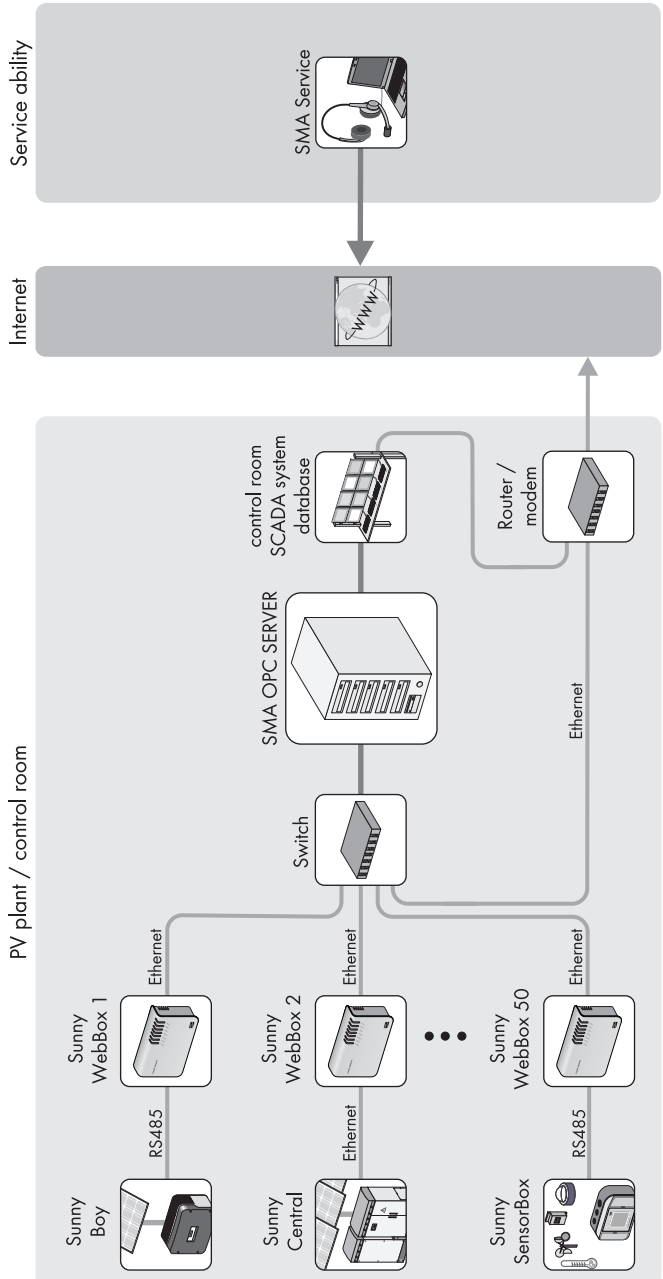
Summary of the main characteristics of the SMA OPC Server

- Output of the instantaneous values of all SMA devices in OPC standard
- Reading and writing the parameters of all SMA devices in OPC standard
- Available OPC standards
  - DA (based on WIN DCOM)
  - XML-DA
- All variables are displayed in STRING data format

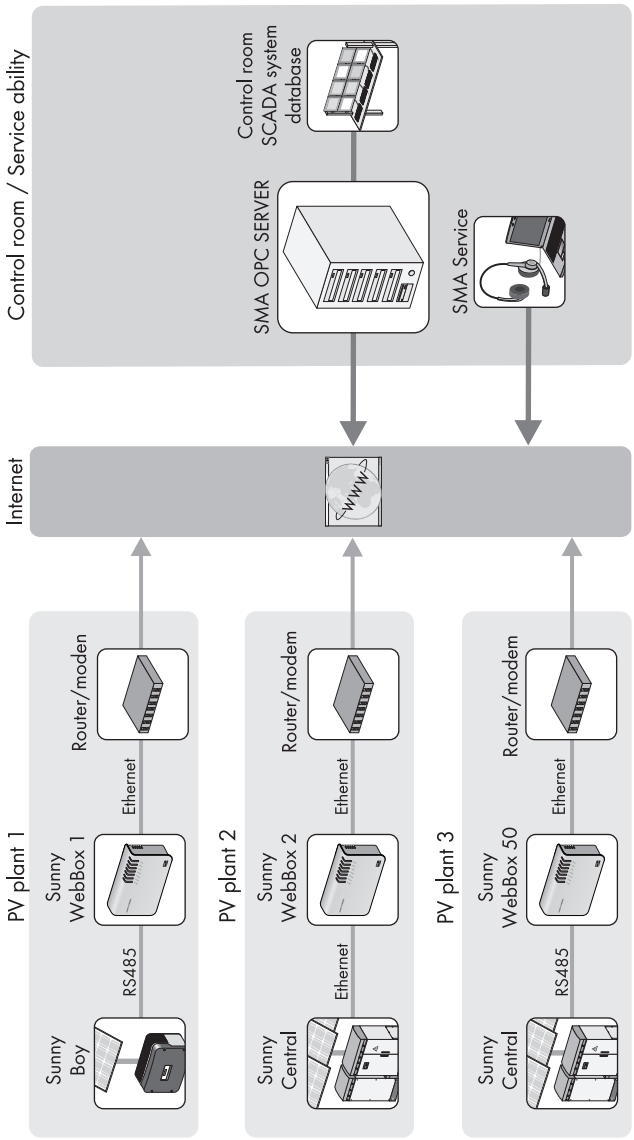
2.2 Integration of the SMA OPC Server into IT System Environment

The SMA OPC Server can be integrated into a variety of IT system environments. The following describes two examples.

Architecture with Decentralized SMA OPC Server and a SCADA System



Architecture with Centralized SMA OPC Server and a SCADA System



2.3 System Requirements

Supported operating systems	Windows XP Professional*, Windows Server 2003,
Processor	2 GHz
Main Memory (RAM)	2 GB
Available hard disk space	10 MB**
Other software	.NET Framework 2.0

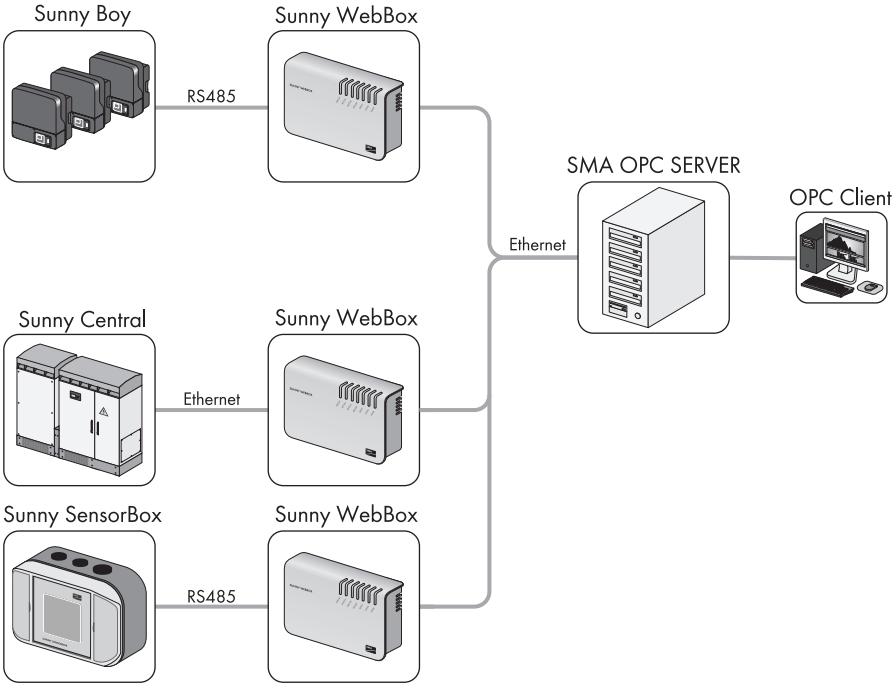
* with Service Pack 2

** without log files

3 Security

3.1 Appropriate Usage

The server-based 32-bit application compiles the instantaneous values of your PV plant for up to 50 Sunny WebBox devices and makes this data externally available to OPC Clients via OPC Data Access and OPC XML-DA. Parameters of the PV plant can also be modified via the SMA OPC Server (see section 6.4.3 "Changing Parameters via the OPC Client" (page 25)). The SMA OPC Server supports all Sunny WebBox devices with firmware version 1.46, and later.



Transfer to third parties, use or duplication of the software without a valid license is prohibited. Violations will be prosecuted.

3.2 Safety Instructions

- Using the software you can change the safety-related parameters of SMA inverters. Incorrectly set parameters can damage or destroy the inverter. Do not alter these safety-relevant parameters without prior consultation with your electric power company operating the grid into which your plant feeds.

3.3 Operating Instructions

- The performance data issued via the SMA OPC Server may differ from the electricity meter data. Do not use the data for billing purposes.

4 Installation

4.1 Notes on Installation

The following section describes the installation of the SMA OPC Server using a Microsoft operating system. Please note the system requirements in section 2.3 "System Requirements" (page 9).

Installation Rights for Installing the SMA OPC Server

You must have administration rights for your operating system in order to install the SMA OPC Server.

OPC Core Components

Before you can process instantaneous values and parameters of the PV plant with an OPC Client, you must install the OPC Core Components valid for your operating system on the SMA OPC Server and the computer of the OPC Client.

The OPC Core Component for the SMA OPC Server can be installed simultaneously with the installation of the SMA OPC Server. The OPC Core Component for the OPC Client is to be found on the CD-ROM provided.

4.1.1 Installing the SMA OPC Server under Windows

The SMA OPC Server requires "NET Framework 2.0"

Install "NET Framework 2.0" before you install the SMA OPC Server. You can install "NET Framework 2.0" directly from the CD or download and install it from www.microsoft.com.

1. Close all open applications.
2. If necessary, uninstall the previous version of the SMA OPC Server (see section 7 "Uninstalling SMA OPC Server" (page 26)).
3. Run "Setup.exe".
4. Follow the instructions of the Installation Assistant. The configuration interface opens automatically.
5. Configure the SMA OPC Server (see section 5 "Configuration" (page 13)).
6. Close installation.

☑ The software is now installed.

5 Configuration

5.1 Notes on Configuration

In order to adjust the SMA OPC Server to your local conditions, choose the following settings:

- Add Sunny WebBox devices.
- Detect namespace.
- Set scanning cycle of the Sunny WebBox devices.
- If necessary, activate OPC XML-DA.

Restarting SMA OPC Server upon completion of configuration

Restart the SMA OPC Server upon completion of the configuration in order to apply the settings.

5.2 Notes on the Network

Network Ports

The SMA OPC Server communicates as standard via Port 80.

If you have enabled security measures in your network that control and limit access to the local network, you must ensure that Port 80 is available. If necessary, read the product manual.

Proxy Server

At present, the SMA OPC Server does not support proxy servers. For this reason, Sunny WebBox devices can not be detected when they can only be accessed via a proxy server.

5.3 Opening the Configuration Interface

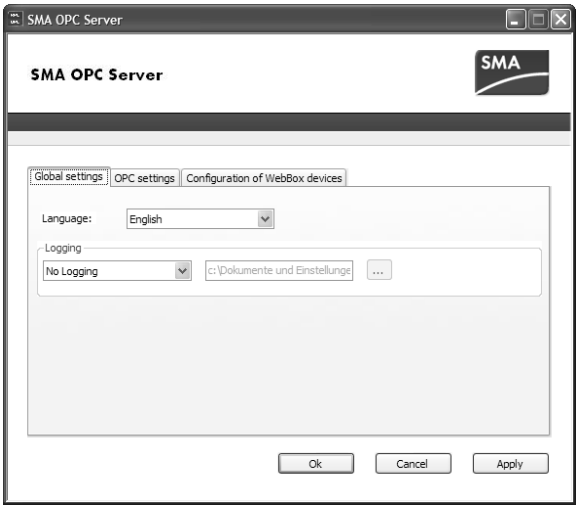
1. Select "Start > Programs > SMA > SMA OPC Server > OPC Server (Config)" in Windows.

☑ The configuration interface opens.

5.4 Configuration Interface

Position	Name	Meaning
A	Tabs	The tabs are the main menu for the configuration interface.
B	Contents section	The respective settings for the SMA OPC Server are entered into the contents section.
C	[Ok]	Saves all current settings and closes the Configuration Interface.
D	[Cancel]	Closes the Configuration Interface without saving the current settings.
E	[Apply]	Saves all current settings without closing the Configuration Interface.

5.5 General Settings



5.5.1 Changing Languages

1. Select the "Global Settings" tab.
2. Select the language in the "Language" drop-down menu.

☑ The language is activated immediately.

5.5.2 Saving Log File

With the help of the SMA OPC Server configuration interface you can generate a log file in .txt format. By means of the log file you can detect the current situation in the network, and use it for troubleshooting when necessary (see section 9 "Troubleshooting" (page 28)).

The SMA OPC Server saves the log file daily in the selected directory and the sub-directory: .../Year/Month/yyyy_mm_dd_logfile.txt.

Example for an error log file of November 01, 2009 that logs all errors:
...selected directory/2009/11/2009_11_01_logfile.txt.

In order to save the log file, proceed as follows:

1. Select the "Global Settings" tab.
2. Select a logging option in the "Logging" field. The following selections are possible:

Logging type	Meaning
No logging	No log file will be saved.
Only Error(s)	Only errors will be saved.
News flow	Both errors and the communication flow with the Sunny WebBox devices will be saved.
Data	Errors, communication flow and data received by the SMA OPC Server will be saved. Note that log files can be very large.

3. Enter the target directory in which the log file should be saved.
4. If necessary, adjust further settings in the configuration interface.
5. Select either [Apply] or [Ok] in order to save the settings.

☑ The log file will be applied upon the next start-up of the SMA OPC Server.

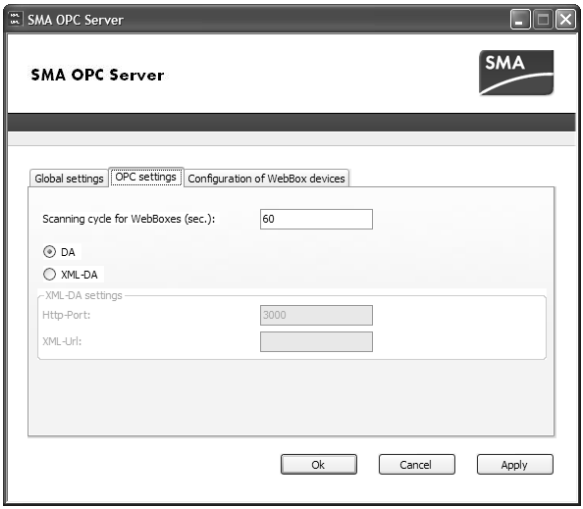
5.6 OPC Settings

The SMA OPC Server is equipped with an OPC Data Access (DCOM-based) interface, via which it makes the instantaneous and the parameter values of your PV plant available. You can also receive the values in xml format via the OPC XML-DA interface.

The SMA OPC Server supports the following interfaces:

- **OPC Data Access (DA)** - Standard setting
- **OPC XML-DA** - optional

5.6.1 Setting the Scanning Cycle of Sunny WebBox Devices



Set the scanning cycle for the SMA OPC Server to scan instantaneous values from the registered Sunny WebBox devices. Thus, all Sunny WebBox devices will be scanned simultaneously at the set time interval.

Duration of instantaneous value update

The time needed to update the instantaneous values depends on the following items:

- Setting the scanning cycle in the SMA OPC Server Configuration
- The number of Sunny WebBox devices and connected devices of the PV plant
- The specific update speed of each individual device

Data traffic via the RPC interface

The SMA OPC Server communicates with the Sunny WebBox via the RPC interface. In order to avoid a large amount of data traffic via the RPC interface, select a time span as high as possible (> 60 seconds) in which the Sunny WebBox devices will be asked for data. You will find the recommended scanning cycle for Sunny WebBox devices in the table on page 18.

1. Select the "OPC settings" tab.
2. In the "Scanning cycle for WebBoxes (sec.)" field, enter the time span in seconds in which the Sunny WebBox devices should be asked for data (default: 60 sec.). For recommended scanning cycles for Sunny WebBox devices please refer to the following table:

Number of Sunny WebBox devices	Number of devices detected in Sunny WebBox	Scanning cycle of Sunny WebBox devices in seconds
1	≤ 25	10
	> 25	30
5	≤ 25	10
	> 25	30
10	≤ 25	10
	> 25	30
20	≤ 25	10
	> 25	40
30	≤ 25	20
	> 25	60
40	≤ 25	40
	> 25	60
50	≤ 25	40
	> 25	60

3. If necessary, adjust further settings in the configuration interface.
4. Select either [Apply] or [Ok] in order to save the settings.

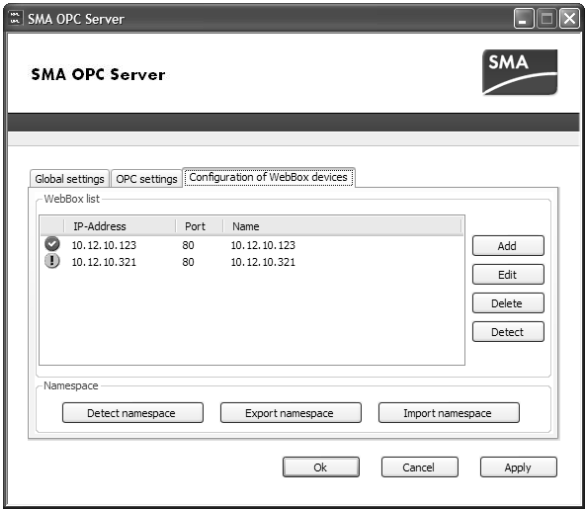
☑ The monitoring cycle of the Sunny WebBox devices is set.

5.6.2 Enabling XML-DA

1. Select the "OPC settings" tab.
2. Select "XML-DA".
   ☑ "XML-DA settings" can be edited.
3. In the "Http-Port" field, enter the port number of the XML service (default: 3000).
4. In the "XML-Url" field, enter the URL of the web service in the format "/*XMLUrl*/".
5. If necessary, adjust further settings in the configuration interface.
6. Select either [Apply] or [Ok] to save the settings.

☑ XML-DA is now activated.

5.7 Configuration of WebBox Devices



5.7.1 Sunny WebBox List

The "WebBox list" contains a list of all the Sunny WebBox devices from which the collected data is to be made available via the OPC interface.

Sunny WebBox List Symbols

The symbol which appears in front of each Sunny WebBox included in the list tells you whether the namespace of the device has been detected properly at least once. If the namespace of the Sunny WebBox is changed after detection, the symbol will not reflect this change. Detect the namespace again so that the changes are displayed.

Symbol	Meaning
	The namespace of the Sunny WebBox has been successfully detected.
	The namespace of the Sunny WebBox has not been detected or an error has occurred during detection (see section 9 "Troubleshooting" (page 28)).

Managing the Sunny WebBox list

You can manage the list via the [Add], [Edit], [Delete] and [Detect] buttons.

Button	Meaning
[Add]	Adds a new Sunny WebBox to the Sunny WebBox list.
[Edit]	Edits the Sunny WebBox selected in the Sunny WebBox list.
[Delete]	Deletes the selected Sunny WebBox from the Sunny WebBox list.
[Detect]	Re-detects the namespace of the selected Sunny WebBox. This is how you can detect individual Sunny WebBox devices (e.g., if their namespace has been incorrectly detected or if a device in the PV plant has been replaced).

5.7.2 Adding a Sunny WebBox Device

Requirements for Sunny WebBox devices

The SMA OPC Server can detect all Sunny WebBox devices with firmware version 1.46, and later.

The Sunny WebBox devices to be detected by the SMA OPC Server must have been commissioned and all devices of the PV plant must have been detected.

1. Select the "Configuration of WebBox devices" tab.
2. Under "WebBox list" select the [Add] button.
   ☑ The "SMA OPC Server" window opens.
3. In the "Name" field, enter the name of the Sunny WebBox under which the Sunny WebBox should appear in the OPC Client.
   You can select any name, but it should be unique and cannot contain any special characters.
4. Enter the IP address or URL of the Sunny WebBox in the "IP-address/URL" field.
5. In the "Port" field enter the port of the Sunny WebBox, under which it is available. If no port number is assigned, port 80 is selected by default.

6. Enter the password of the Sunny WebBox in the "Password" field.

   The password defines the read/write permission for the parameters. If necessary, read the Sunny WebBox manual.

7. Select [Save].

   ☑ The "SMA OPC Server" closes and the Sunny WebBox is added to the list.

8. If necessary, adjust further settings in the configuration interface.

9. Select either [Apply] or [Ok] to save the settings.

☑ The Sunny WebBox has now been added to the list.

5.7.3 Namespace

The Sunny WebBox delivers all parameters and instantaneous values of the connected devices (e.g. Sunny Boy inverters, Sunny Central inverters or Sunny SensorBox devices) to the SMA OPC Server. This data is designated as Namespace. The namespace is made available to the OPC Clients via the OPC interface of the SMA OPC Server.

Before detecting the namespace with the SMA OPC Server, all the devices of the PV plant must have been commissioned and detected by the relevant Sunny WebBox.. Otherwise, the namespace cannot be properly detected.

Changes in the Sunny WebBox configuration

Re-detect the namespace with the SMA OPC Server if there are any changes to the following properties of a Sunny WebBox:

- Change of firmware of the connected devices
- Change of the network setting of the Sunny WebBox
- Change in the devices of a PV plant which are detected via the Sunny WebBox (e.g., when an inverter is added, removed or replaced)

Generate namespace backup file

After detecting the namespace create a backup file using the [Export namespace] button. Save the backup file on a secure drive so that you can re-import the namespace in case of data loss. The Sunny WebBox devices do not need to be reentered.

Button	Meaning
"Detect namespace"	Detects the namespace of all registered Sunny WebBox devices. For large systems, the detection of the namespace can take up to 60 minutes.
"Export namespace"	Exports the namespace of all registered Sunny WebBox devices in xml format.
"Import Namespace"	Imports a previously exported namespace.

Parameter overview

You will find a complete list of instantaneous values and parameters in the respective manual of your SMA product. The most frequently used instantaneous values can be found in section 10 ”Measuring Channels” (page 30).

5.7.4 Replace Device

If you replace one or more devices in your PV plant, you must then re-detect the namespace of the given Sunny WebBox with the SMA OPC Server. To do this, proceed as follows:

1. Take the device to be replaced out of operation by following the instructions for that device.
2. Start up the new device by following the instructions for that device.
3. Connect the new device to the Sunny WebBox by following the operating instructions for the Sunny WebBox.
4. Detect the new device at the Sunny WebBox by following the operating instructions for the Sunny WebBox.
5. Re-detect the Sunny WebBox namespace on the OPC Server via the configuration interface. To do this, go to the "Configuration WebBox devices" tab in the "WebBox list", select the Sunny WebBox to which you have attached the new device, and then select [Detect].

   ☑ The namespace of the selected Sunny WebBox has been re-detected.

   Caution: Replacing the device will change the connection of the OPC Client to the OPC Server.
6. Adjust the OPC Client variables to the OPC Server addresses.

☑ The device has now been replaced, and the Sunny WebBox namespace is now re-detected at the SMA OPC Server. The OPC Client connection to the SMA Server has been adjusted.

5.7.5 Device Firmware Update

If you carry out a firmware update for one or more devices in your PV plant, you must then re-detect the namespace of the given Sunny WebBox with the SMA OPC Server. To do this, proceed as follows:

1. Carry out device firmware updates as described in the operating instructions for that device.
2. Detect the device with a new firmware version at the Sunny WebBox by following the operating instructions for the Sunny WebBox.
3. Re-detect the Sunny WebBox namespace on the OPC Server via the configuration interface. To do this, go to the "Configuration WebBox devices" tab in the "WebBox list", select the Sunny WebBox to which you have attached the device with a new firmware version, and then select [Detect].

   ☑ The namespace of the selected Sunny WebBox has been re-detected.

   Caution: Updating the firmware version of the device will change the connection of the OPC Client to the OPC Server.
4. Adjust the OPC Client variables to the OPC Server addresses.

☑ The device has now been replaced, and the Sunny WebBox namespace is now re-detected at the SMA OPC Server. The OPC Client connection to the SMA Server has been adjusted.

6 Operation

6.1 Starting SMA OPC Server

1. Select "Start > Programs > SMA > SMA OPC Server > OPC Server" in Windows.
   - Alternatively, click on the "SMA OPC Server" desktop icon on the desktop.

☑ The server is now running and supplying the instantaneous and parameter values of the PV plant via Data Access (DA) and/or OPC XML DA to OPC Clients.

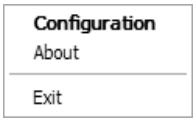
6.2 Status Display

The status of the SMA OPC Server is displayed via the tray icon.

Symbol	Status	Meaning
	Glows green	The SMA OPC Server is initialized and operating.
	Glows red	The namespace is not detected. Re-detect the namespace.
	Green, yellow, red flashing intermittently	The SMA OPC Server is carrying out the initialization.

6.3 Exit the SMA OPC Server

1. Click with the right mouse button on the Tray Icon of the SMA OPC Server in the task menu.
2. Select "Exit".



☑ The SMA OPC Server will close. Depending on the amount of data, this can take up to 2 minutes. The Tray Icon will be removed from the task menu.

6.4 OPC Client Notes

6.4.1 OPC Client Installation

OPC Core Components

Before you can process instantaneous values and parameters of the PV plant with an OPC Client, you must install the OPC Core Components valid for your operating system on the SMA OPC Server and the computer of the OPC Client.

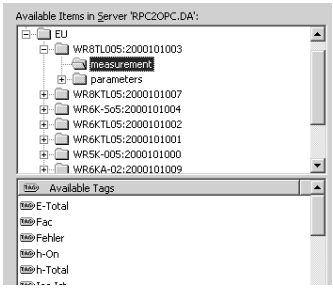
The OPC Core Component for the SMA OPC Server can be installed simultaneously with the installation of the SMA OPC Server. The OPC Core Component for the OPC Client is to be found on the CD-ROM provided.

6.4.2 Displaying the namespace in an OPC Client

The namespace is displayed hierarchically in an OPC Client. The individual devices of the PV plant will be listed under the Sunny WebBox.

Each device contains the subdirectories "measurement" for the instantaneous values and "parameters" for the parameters.

Example: OPC Client with the selection of the Sunny WebBox "EU" > Inverter "WR8TL005:2000101003" > "measurement".

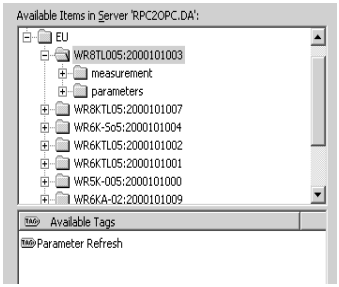


6.4.3 Changing Parameters via the OPC Client

During start-up of the SMA OPC Server, the server detects the parameter values of the connected Sunny WebBox devices once and makes these available to the OPC Client.

When parameter values are changed directly via a communication device (e.g., Sunny WebBox), these changes are not displayed automatically at the OPC Client.

You can update the parameter values by means of the "Parameter Refresh" option. To do this, enter "SMA" as the value in "Parameter Refresh", and save this value. The SMA OPC Server will update all device values. This can take up to 2 minutes.



7 Uninstalling SMA OPC Server

Write permission for uninstalling the SMA OPC Server.

You will need write permission for your operating system in order to uninstall the SMA OPC Server.

1. Shut down all OPC Clients communicating with the SMA OPC Server.
2. Exit the current OPC Server.
3. In Windows select "Start > Programs > SMA > SMA OPC Server > Uninstall OPC Server".
4. Follow the on-screen instructions.

☑ The SMA OPC Server is uninstalled.

8 Updating the SMA OPC Server

1. Uninstall the current SMA OPC Server (see section 7 "Uninstalling SMA OPC Server" (page 26)).
2. Install the new version of the OPC Server (see section 4 "Installation" (page 12)).

Existing Sunny WebBox list is automatically transferred

The Sunny WebBox list is adopted from the previous SMA OPC Server version. However, you must re-detect the namespace.

3. Configure the new version of the SMA OPC Server (see section 5 "Configuration" (page 13)).
4. Check whether the current Sunny WebBox list has been adopted.

☑ The new SMA OPC Server is installed.

9 Troubleshooting

#	Problem	Cause	Rectification
1	The network is not available. (Error code: 12028)	Incorrect network configuration	• Check the network settings for the installed network components (e.g., server, router, Sunny WebBox devices, etc.) and adjust if necessary.
		Defective network component cabling and plug connections	• Check cabling and plug connections of the individual network components (e.g., server, router, Sunny WebBox devices, etc.) for damage, and replace damaged cables or plugs, if necessary.
		Defective network components	• Check that the individual network components (e.g., server, router, Sunny WebBox devices, etc.) are operating properly. Replace defective devices if necessary.
		Incorrect internet access data	• Check internet access data. Correct settings if necessary.
2	The namespace file cannot be saved.	Missing write permission on the drive	• You require write permission for the drive on which the SMA OPC Server is installed. Change your user rights and re-detect the namespace.
3	The config file cannot be saved.	Missing write permission on the drive	• You require write permission for the drive on which the SMA OPC Server is installed. Change your user rights.
4	The namespace file could not be imported.	Invalid namespace file format	• Only namespace files that were exported via the SMA OPC Server configuration interface can be imported. • The namespace file must not be changed.
5	The program is already running.	The SMA OPC Server can only be started once.	• Exit the SMA OPC Server before restarting the server.

#	Problem	Cause	Rectification
6	The namespace of an entered Sunny WebBox is invalid.	The Sunny WebBox generated a communication error with the devices in the PV plant.	• Check the Sunny WebBox communication with each device in the PV plant. All devices in the PV plant must be started. If communications have failed, rectify the problem and re-detect the connected devices with the Sunny WebBox. After this, re-detect the namespace of the given Sunny WebBox with the SMA OPC Server.
		The Sunny WebBox replied with an error.	
		Devices of the PV plant are not detected with the Sunny WebBox.	
		The Sunny WebBox did not reply.	
		No devices from the PV plant are connected to the Sunny WebBox.	
7	The Sunny WebBox is taking too long to respond.	The query has exceeded the permitted time. (Error code: 12002)	• The SMA OPC Server will send another query. If the problem does not resolve itself, the error code 12029 will subsequently be displayed.
		The attempt to generate a Server connection failed. (Error code: 12029)	• Check the network (see point 1). • If this does not solve the problem, please contact the SMA Serviceline and provide the log file.
8	Display problems in the configuration interface using Windows XP	The classic style is selected for windows and buttons.	• If the "classic" style is used in Windows, it can lead to display problems on the configuration interface. Use the "XP style" for windows and buttons.
9	The OPC Client is not displaying data.	Missing OPC Core Components	• Install the OPC Core Components on the computer on which the OPC Client is installed.
10	The OPC Client parameter values are not current.	The "Refresh" parameter has not been run.	• Run the "Refresh" parameter.

10 Measuring Channels

In the following table the most frequently used instantaneous values are listed using the Sunny Central 630HE as an example. You will find a complete list of instantaneous values and parameters in the respective manual of your SMA device.

Inverter

Channel name	Unit	OPC Address
Mode	-	WebBox_Name.SC630HE:123456789.measurement.Mode
Upv	V	WebBox_Name.SC630HE:123456789.measurement.Upv
Ipv	A	WebBox_Name.SC630HE:123456789.measurement.Ipv
Ppv	kW	WebBox_Name.SC630HE:123456789.measurement.Ppv
Iac	A	WebBox_Name.SC630HE:123456789.measurement.Iac
Pac	kW	WebBox_Name.SC630HE:123456789.measurement.Pac
E-heute	kWh	WebBox_Name.SC630HE:123456789.measurement.E-heute
Vac L1	V	WebBox_Name.SC630HE:123456789.measurement.VacL1-L2
Vac L2	V	WebBox_Name.SC630HE:123456789.measurement.VacL2-L3
Vac L3	V	WebBox_Name.SC630HE:123456789.measurement.VacL3-L1
Fac	Hz	WebBox_Name.SC630HE:123456789.measurement.Fac
Fehler	-	WebBox_Name.SC630HE:123456789.measurement.Fehler
TmpInt C	°C	WebBox_Name.SC630HE:123456789.measurement.TmpInt C
h-On	h	WebBox_Name.SC630HE:123456789.measurement.h-On

String-Monitor

Channel name	Unit	OPC Address
IString1	A	WebBox_Name.SC630HE:123456789.SMU8b005:987654321.measurement.IString 1
IString2	A	WebBox_Name.SC630HE:123456789.SMU8b005:987654321.measurement.IString 2
Fehler	-	WebBox_Name.SC630HE:123456789.SMU8b005:987654321.measurement.Fehler

11 Contact

If you have technical problems concerning our products, contact the SMA Serviceline. We require the following information in order to provide you with the necessary assistance:

- Software version of the SMA OPC Server
- Operating system
- Log file

SMA Solar Technology AG

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SMA Serviceline

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